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PATENT APPLICATION OF  
BERTRAND DUPLAT  
ENTITLED

A PROCESS AND A SYSTEM FOR CREATING, ON A  
GRAPHIC INTERFACE, THREE-DIMENSIONAL  
ANIMATED GRAPHIC IMAGES THAT ARE  
INTERACTIVE IN REAL TIME

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A PROCESS AND A SYSTEM FOR CREATING, ON A GRAPHIC INTERF  
ACE, THREE-DIMENSIONAL ANIMATED GRAPHIC IMAGES THAT ARE  
INTERACTIVE IN REAL TIME

This invention concerns the processes and the systems that permit the creation of animated images on a graphic interface.

5 There is knowledge of such processes and such systems. We shall cite notably the following documents, which describe such graphic interfaces: WO 99 06961 (MORGAN Gareth John d'Arcy et al), WO 98 35320 (PARKIN Godfrey Maybin et al.), WO 98 45813, US 5,867,175A (MACKINNON Donald Glen et al.).

10 The invention concerns, more specifically, a process for creating on a graphic interface three-dimensional animated graphical images representing scenes comprising objects and/or characters. The graphical images are designed by a designer-operator so  
15 that they can later be animated, interactively, in real time, by the user (the "final consumer" player) for whom they are intended.

The process in the invention comprises the steps described hereinafter:

20 a) the step of selecting, in libraries of objects and/or characters, at least one object and/or character,

b) the step of displaying the object and/or character on the graphic interface,

c) the step of selecting, in the behaviour libraries, the behaviour of an object and/or a character,

d) the step of assigning the selected behaviour to an object or to a character appearing on the graphic interface.

The aforementioned behaviours have the characteristic of reacting, in whole or in part, interactively, in real time, to requests. More specifically, the behaviours react to efforts to elicit actions emanating from the player-users. The latter intervene by means of a control unit, notably a keyboard or a mouse. For example, the explosive behaviour of a first object can be linked to the movement of a second object passing close to the first object. The second object is activated and set in motion by the player-user by means of the control unit.

The process in the invention comprises, in addition, the step of assembling on a graphic interface, according to the sequences and the tree structures of an interactive animated script that is in the course of being designed, visual components symbolizing the objects and/or the characters involved in the animated scene, as well as the behaviours that are assigned to them.

Script designers, notably of interactive games, can thus display the different sequences and the tree structures of the interactive animated scenarios as they are being designed. Game designers can then concentrate on the writing of interactive scripts, and then produce them rapidly using ergonomic graphical tools on their graphic interface.

Preferably, the process in the invention comprises, in addition, the step of creating series of behaviours,

notably, the explosion of one object can be sequenced to the movement of another object passing close by in the scene represented on the graphic interface. It is thus possible to generate modules (otherwise known as components) of sequenced behaviours of objects and/or characters, which can be reassembled into other modules (or components), then into more complex interactive animated scripts.

Thus, thanks to these series of behaviours, the interaction, in real time, with the player is strengthened. The event that occurs is calculated, at any given moment, as a function of the environment, which the player can modify.

The procedure in the invention preferably comprises, in addition, the step of selecting, in libraries of camera perspectives, the perspective of the camera displaying the three-dimensional scene.

The invention also involves a system for creating on a graphic interface three-dimensional graphical images representing scenes comprising objects and/or characters. The graphic images are designed by a designer-operator to be animated interactively, in real time, by the users for whom they are intended. The graphic interface is associated with a calculating device and a command unit.

In the invention, the calculating devices and the command units comprise a first calculating device and a first command device. This first calculation device and this first command device allow the designers:

- to select, in libraries of objects and/or characters, at least one object and/or character, and
- to display the object and/or character on the graphic interface.

The calculating devices and command units comprise, in addition, a second calculating device and a second command device. These devices allow the designers:

- to select, in libraries of behaviours, the behaviour of an object and/or a character, for example, an explosive behaviour or a movement, and

5 - to assign the selected behaviour to an object or to a character appearing on the graphic interface.

The behaviours have the characteristic of reacting interactively, in whole or in part, to efforts to elicit actions emanating from the users (the "final consumer" player) intervening by means of an operating control, notably a keyboard. For example, the explosive  
10 behaviour of a first object can be linked to the movement of a second object passing close by the first object. The movement of the second object is activated by the player-user by means of the operating control.

15 In addition, the calculating devices and the command units comprise a means of activation for activating on the graphic interface one or more areas on which the designer-operator assembles, according to the sequence and the tree structures of an interactive  
20 animated script that is being designed, visual components symbolising the objects and/or characters involved in the animated scene as well as the behaviours that are assigned to them. The designer can thus display the various sequences and tree structures of the  
25 script as it is in the process of being designed. This technical trait makes an essential contribution to the ergonomics of the system of creating three-dimensional graphical images that are interactive in real time.

30 The calculating devices and the command units of the system in the invention preferably also comprise a third calculating device and a third command device for selecting in the libraries of camera perspectives the camera perspective displaying the three-dimensional scene.

35 In addition, the calculating devices and the command units of the system in the invention comprise a

fourth calculating device and a fourth command unit for creating series of behaviours, notably the explosion of one object during the movement of another object close by in the scene represented on the graphic interface.

5 It is thus possible to generate modules of sequenced behaviours of objects and/or characters, which can be reassembled into other modules, and then into more complex interactive animated scripts.

Other characteristics and advantages of the  
10 invention will appear on a reading of the description of production variants of the invention, given to provide indicative, but not exhaustive, examples and on examination of the following:

- figure 1, which illustrates a graphic computer  
15 interface in the invention and the associated calculating devices and command units,

- figures 2 and 3, which illustrate the graphical tools used by a designer of animated scripts for selecting a star in a database and for displaying on  
20 the graphic interface, as well as for assigning a behaviour to it-exploding under certain conditions,

- figure 4, which shows the graphical tools utilised by a designer of animated scripts in order to link the explosive behaviour of the star to follow the  
25 movement of a sphere close by.

We shall now describe, while referring to figures 1, 2, and 3, the graphical tools used by a designer of animated scripts in order to select a star 2 in a data base 3 and to display it on the graphic interface 1, 1a,  
30 as well as to assign to it a behaviour 5, that of exploding under certain conditions.

Note: The written information appearing in plain language on the graphic interface is in the English language. In fact, the graphic interface is intended  
35 for sale not only in France but also outside of France.

The directions concerning its use have thus been expressed in English.

The lexicon that follows hereinafter provides the translations of the words or expressions that appear in the description of this invention.

Basic forms: basic forms

Yellow star: Yellow star

Red sphere: Red sphere

Cameras: Cameras

10 Lights: Lights

Under the behaviour menu: Under the menu of behaviours

Mesh modifier: "3D shape modifier" behaviour

Explode: "Explosion" behaviour

15 Wait message: "Await message" behaviour

On click: "On mouse click" behaviour

Logics: "Logic" category behaviour

Proximity: Behaviour detecting the proximity between two objects

20 Send message: "send message" behaviour.

The graphic interface 1 is associated with a calculating device 2 and a command unit, notably a keyboard 3 and a mouse 4. Connection cables 5a and 5c interconnect these various devices. An electric power cable 6 provides the necessary energy. An operating system allows the functioning of the entire system to be managed in a self-explanatory manner.

The calculating devices 2 and the command units 3, 4 comprise a first calculating device and a first command device. This first calculating device and first command device allow the designer of scripts to select, in the libraries of objects and/or characters appearing on the graphic interface 1, at least one object and/or character. To this end, by means of the command unit 4, the script designer makes a menu comprising one "Basic Forms" icon 7 appear in the window 1b of the graphic

interface 1. By clicking on this icon by means of the command unit 4, we make a menu with a list of the various objects and/or characters that are likely to be selected appear on part 1c of the graphic interface 1.

5 In the case of the production variant described, the following icons appear: "YellowStar" and "RedSphere". By clicking on the "YellowStar" and/or "RedSphere" icon, we make a three-dimensional image of these objects (figure 2, reference 8 and figure 4, reference 9) appear

10 in part 1a of the graphic interface 1. The position of this object vis-à-vis the spectator (the perspective of the camera), as well as the position of the light source, can be selected by clicking on the "Cameras" 10 or "Lights" 11 icons that appear in part 1b of the

15 graphic interface 1.

By clicking on the "YellowStar" and/or "RedSphere" icon, we cause a schematic representation figure 2, 15, and figure 4, 16 of the "YellowStar" and "RedSphere" objects to appear simultaneously in the part 1d of the

20 graphic interface 1 that is devoted to the schematic representation of the modules comprising the interactive scenario.

In the invention, the calculating device 2 and the command units 3, 4 comprise, in addition, a second

25 calculating device and a second command device, which allow the script designer to select, in the behaviour libraries appearing on the graphic interface 1, the behaviour of an object and/or a character, for example, an explosive behaviour or a movement. To this end, by

30 means of the command unit 4, the script designer causes a sub-menu of behaviours called "Behaviors" comprising a "MeshModifier" icon 12 to appear in the window 1b of the graphic interface 1. By clicking on this icon by means of the command unit 4, we cause a menu to appear

35 in part 1c of the graphic interface 1 with a list of behaviours of the "MeshModifier" type that are likely to



be selected. Notably, in the case of the production variant described here, the "Explode" icon 13 appears. By clicking on the "Explode" icon, we cause a parametrable image 14 of this type of behaviour to appear in part 1d of the graphic interface 1, opposite the schematic representation 15 of the "Yellow Star" object. This image may, for example, be in the shape of a rectangle with entrance and exit markers. In the case described in referring to figure 2, a parametrable link 17a, 17b links, through a "wait message" behavioural function 18, the schematic representation 15 of the "YellowStar" object to the parametrable image 14 of the "Explode" behaviour. We have thus assigned to the "YellowStar" object 8, 15 the "Explode" behaviour 14. The "wait message" behavioural function 18 is also represented by a rectangle with entrance and exit markers. The expected message, which elicits the execution of the "Explode" behaviour 14, in the case represented here, the "OnClick" message 19. Thus, subsequently, after designing the game, the user-player ("final consumer") can, by clicking with the command unit 4, provoke the explosion of the "YellowStar" object. The game designed by the designer-operator thus has the characteristic of being interactive in real time with events or efforts originating from the exterior, for example, from a player's action on the mouse.

We shall now describe figure 4, which presents the graphic tools used by a designer of interactive animated scripts to pipe the explosion behaviour of the "YellowStar" object when the "RedSphere" object passes close to it. We recognize in figure 4 most of the components described in referring to figures 1, 2, and 3; they bear the same references. The script concerning the "RedSphere" is described below. In the library in the window 1b, the "Logics" behaviour 21 has been selected. The corresponding window 1c comprises in its

menu "Proximity" 22. The "Proximity" function 22 is symbolised by the rectangle 23, in the script 1d concerning "RedSphere". A logical link 23a is established between the "Proximity" behaviour 22, 23 and the "RedSphere". A logical link 23b is likewise established between the "Proximity" behaviour 22, 23 and the "send message" function, which is represented in the script by the rectangle 24. The "send message" function 24 issues the "OnClick" message 25 at destination 26 of the "YellowStar" object. Thus, when the "RedSphere" object passes close by the object "YellowStar", the "OnClick" message is issued and activates the "wait message" function, which activates, in turn, the "Explode" behaviour assigned to the object "YellowStar". "Proximity" is a behaviour that verifies that the distance between two objects reaches a set threshold. The logical link is established by utilising a dialogue box by means of which the two objects are defined.

20 According to a process comparable to that described above, we can simultaneously control the movement behaviour of the object "RedSphere", by using command units 3 and 4. Thus, in steering the course of movement of the "RedSphere" object as desired, the player provokes the explosion of the "Yellow Star" object, when the "Red Sphere" object passes near the "Yellow Star" object or not, as the player wishes.

This example allows us to show two levels of interactivity in real time:

30 - On the one hand, (the first level) the 3D objects "Yellow Star" and "RedSphere" interact in accordance with events that proceed on the scene of the graphic interface,

- On the other hand, (the second level) the efforts to elicit action that affect the unfolding of

the events can emanate from the "end consumer" player activating the operating controls (keyboard, mouse).

5       The calculating devices 2 and the command units 3 and 4 allow the script designer to create series of behaviours, notably, the explosion of one object while another object is passing nearby. The calculating devices 2 and the command devices 3, 4 comprise a means of activation for activating on the graphic interface 1 one or more zones 1d on which the operator can assemble, according  
10   to the sequences and the tree structures of an interactive animated script in the course of being designed, visual components 15, 16 symbolising the objects involved 8, 9 in the animated scene as well as the behaviours 14, 23 that are assigned to them. This combination of means  
15   also allows the generation of sequenced modules of object behaviours, which can be reassembled into other modules and then into more complex interactive animated scripts. It is thereby possible to display the various sequences and the tree structures of the script as it is being  
20   designed.